NOAA Technical Memorandum NOS OMS 6

CHEMICAL CONTAMINANTS IN MARINE MAMMALS FROM WASHINGTON STATE

John Calambokidis, John Peard,
Gretchen H. Steiger, and James C. Cubbage

Cascadia Research Collective
Olympia, Washington

Robert L. DeLong
National Marine Mammal Laboratory
Seattle, Washington

Rockville, Md.
June 1984

UNITED STATES DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

National Oceanic and Atmospheric Administration
John V. Byrne, Administrator

National Ocean Service
Paul M. Wolff,
Assistant Administrator

EXECUTIVE SUMMARY

The objectives of this study were to report the results of recent analyses of environmental toxicants in Washington marine mammals and evaluate the evidence for pollutant-related effects in marine mammals. In the last eight years, samples of close to 100 marine mammals from Washington State have been analyzed for concentrations of the chlorinated hydrocarbons: polychlorinated biphenyls (PCBs) and 2,2-bis-(p-chlorophenyl) -1,1-dichloroethylene (DDE). These samples have consisted primarily of harbor seal tissues, but also include minke whale, killer whale, pygmy sperm whale, harbor porpoise, Dall's porpoise, an unknown species of sea lion, and river otter. Data from these analyses are summarized in this report. Tissues from an additional 17 harbor seals from Southern Puget Sound were analyzed for a broader range of synthetic chlorinated organics, metals and other trace elements, and polyaromatic hydrocarbons. These results are also reported.

PCB and DDE concentrations in harbor seals varied widely; the highest concentration of PCBs was 750 ppm (wet weight) found in the blubber of one harbor seal from Southern Puget Sound. PCB concentrations were substantially higher than DDE concentrations in all samples except in a couple of the cetacean samples. Concentrations of PCBs and DDE varied significantly by location. Seals from Southern Puget Sound contained the highest levels. Concentrations of PCBs and

DDE also varied significantly by age, with adults showing higher concentrations than pups and subadults.

The concentration of PCBs and DDE are substantially higher in harbor seals than in the fish they eat. We found PCBs in the scat of seals and found evidence that some PCB components are metabolized by seals. However, an examination of the body burden of PCBs and DDE in seals indicates seals absorb most of the PCBs and DDE present in their diet and retain it in their blubber.

A number of other synthetic chlorinated organics were detected in harbor seals but in substantially lower concentrations than PCBs and DDE. Analyses for metals and trace elements in harbor seal liver and kidney revealed high concentrations of mercury (Hg) in some samples. High mercury concentrations occur frequently in marine mammals. We analyzed for polyaromatic hydrocarbons, but none were detected.

PCBs appear to be the primary pollutants of concern in Puget Sound marine mammals. PCBs have been implicated as the cause of reproductive problems in pinnipeds from the Baltic and Wadden Seas in European waters and the Channel Islands in Southern California. PCB concentrations in Southern Puget Sound harbor seals are among the highest found anywhere in the world and are in the same range as those implicated as causing biological disorders in other areas.

Reproductive disorders in harbor seals from Southern Puget Sound were reported in the early 1970s and pollutants may have been a contributing factor. A thorough study to determine the presence of possible contaminant-related disorders is needed.